

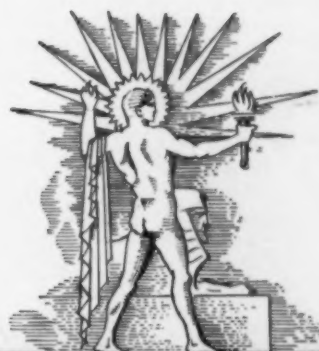
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OCT 20 1930

SCIENCE NEWS LETTER

THE WEEKLY SUMMARY OF CURRENT SCIENCE •



OCTOBER 18, 1930

Died, Despite Skill of Ancient Peruvian Surgeons

(See page 249)

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Vol. XVIII

No. 497

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DO YOU KNOW THAT

The British scientific world plans to celebrate the centenary of Michael Faraday's discovery of electro-magnetic induction, September, 1931.

Contrary to popular belief, comparatively few boomerangs are of the type that circle and return to the thrower.

The difficulty of finding horsehair in this automobile age has driven many birds to substitute string as nest building material.

Ninety-six per cent of diamonds are "finger-printed" by their imperfections which may be used in identifying them, according to a gem expert.

Nutrition specialists point out that cheese won its unfavorable reputation for being indigestible because it was so often eaten in addition to meat and eggs instead of as a substitute for them.

African medicine men linked the mosquito with malaria when European scientists still thought the disease due to inhaling gases from swampy lands, according to a British official of East Africa.

In some African tribes, the chief is the official rain-maker, and is supposed to command rainfall and sunshine.

Next year will mark the one hundredth anniversary of the discovery of chloroform.

A good many fishes change color when disturbed, due to contraction and expansion of color cells.

Beech trees form a shade so dense that other trees and bushes nearby rarely survive.

One animal may "catch" warts from another, a pathologist of the U. S. Department of Agriculture has proved.

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Science Service presents a radio drama

A FUTURE JOURNEY TO THE MOON

By Dr. John Q. Stewart, associate professor of astronomical physics at Princeton University. The principal part will be taken by Dr. Stewart in the presentation,

Friday, October 24, at 3:45 p. m., Eastern Standard Time

Over Stations of

The Columbia Broadcasting System

AERONAUTICS-ENGINEERING

American Airships Protected From Explosion by Helium

Opinion Grows For Giving Other Countries Protection In Peace Time by Lifting Ban on Helium Exportation

FOR YEARS to come, at least, American airships will be free of the danger of such an accident as that which befell the British R-101.

The Los Angeles, or the new and larger ships now under construction at Akron, may crash, just as a train or automobile may, but the danger of explosion of the highly inflammable hydrogen has been eliminated, because these huge gas bags are filled with helium. Nobody has yet succeeded in making helium combine chemically with another element, and burning is merely a very rapid combining of one element with oxygen.

When the Shenandoah was destroyed in a line squall in Ohio, there was a tragic loss of life, but this was not as great as if hydrogen had been used for the lifting gas. Then there was no explosion and fire of the gas bag, even though the gasoline did burn.

Diesel Engine Possibilities

If the Diesel engine, now commercially used for airplanes and tried on the R-101, can be adapted to the lighter-than-air craft, this danger will be removed and then the airship will be inherently the safest form of aerial vehicle, for fire danger will be almost completely eliminated, and its buoyancy will keep it afloat even if all the power is cut off. Only a severe storm could tear it apart. Even then, as the gas bag is divided into a number of compartments, the pieces would probably float for some time. And by a complete network of radio-equipped weather stations in all parts of the world, such storms can be dodged, just as Dr. Hugo Eckener frequently dodged them in his flights in the Graf Zeppelin.

As far as anyone knows, the United States has the only really practicable supply of the once rare gas, helium. The Helium Division of the Bureau of Mines, of the U. S. Department of Commerce, has control over this supply, and operates several plants for its production. It has been stated that the plants in present operation will supply all the needs of the army and navy for 50 or

60 years to come. In addition there are probably other supplies, at present undeveloped, that could be used if necessary. One supply of helium-bearing natural gas in Utah, has been set aside as a national reserve. The original helium for airships was obtained from the Petrolia fields, in Clay County, Texas. Within the last two years, however, a much larger plant has been placed in operation near Amarillo.

Since helium is considered as a valuable weapon of war, and as it was desired to conserve this, and to prevent any foreign power from accumulating a supply that might possibly be used against us, the law was passed which forbids its exportation. The suggestion has now been made that this law be changed, as a humanitarian measure, and that other nations be sold some.

It is the opinion of Admiral William A. Moffett, chief of the Bureau of Aeronautics of the Navy Department, that the United States is now in a position to supply helium to foreign nations for peace time use in their airships. Dr.

R. B. Moore, dean of the School of Science, Purdue University, and former chief chemist of the U. S. Bureau of Mines also told Science Service that he believes the "ban should be removed in peace time, provided our own airship program is pushed ahead and not restricted, and provided that helium sent abroad to any country should be limited to their immediate peace time needs, and shall not be stored in large quantities for possible use in war."

How Obtained

However, it is thought that our supply is not inexhaustible. The original field, at Petrolia, has now been largely exhausted, and while it is estimated that the Amarillo plant is capable of producing 24 million cubic feet a year, this could probably not be continued indefinitely. Privately owned plants, in Kansas and Colorado, also yield large amounts of the gas.

The natural gas from which it is extracted at Amarillo comes from government owned wells to the northwest of the city, from whence it is piped to the reducing plant. Here the natural gas is cooled to 300 degrees below zero Fahrenheit at which temperature all of the constituents except the helium condense to a liquid and some even freeze to a solid. Then the remaining gas, which is pure helium, is drawn off. The liquid and solid residue is warmed up to ordinary temperatures and it all becomes a gas again.

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R-101, SURVIVED BY THREE BIG AIRSHIPS

Two more are under construction and a fifth is contracted for. The largest remaining is the British R-100, which recently made a successful flight to Canada, with 3,000,000 cubic feet capacity. Second is the Graf Zeppelin, of Germany, which has made so many successful flights across oceans, including its famous trip around the world. Its capacity is 3,708,000 cubic feet. The American Los Angeles, which, like the Graf, was built at the Zeppelin works at Friedrichshafen, Germany, is third, with 2,600,000 cubic feet. A new German airship, now under construction, is designated the LZ-128, and will have a capacity of 5,500,000 cubic feet. This is exceeded by the American ZRS-4, being built at Akron, Ohio, on the Zeppelin model, which will have a capacity of 6,500,000 cubic feet. A twin ship to this, the ZRS-5, will be built later at Akron.

MICROSCOPY

New Method Shows Scientists Growth of Living Tissue

Application of Development at University of Pennsylvania To Reveal Cell Behavior in Cancer and Tuberculosis

A METHOD which enables scientists for the first time to study over a long period the microscopic details of the growth of living tissue in a warm-blooded animal has been developed in the laboratory of anatomy at the University of Pennsylvania's School of Medicine.

Through its use, the cellular changes in living tissues can be studied as by no other method, and fundamental information regarding the manner in which abnormal cellular reactions occur in infectious diseases like tuberculosis and in tumor growth like cancer will be obtainable.

That such cellular reactions occur has long been known by the end results seen in these diseases, but by enabling the observer actually to see the entire process of cell changes the new method opens the door to enormous advances in knowledge.

The method, for whose rapid perfection and extension the Rockefeller Foundation has made a \$75,000 grant to the university, consists of the introduction of a transparent, double-walled chamber, or "window," into a small hole made in the ear of a rabbit, the perforation being made in much the same manner as the human ear is pierced for the wearing of certain types of earrings.

Look In A "Window"

One side of this "window" is of celluloid or glass, and the other of a very thin sheet of mica. The edges of the space intervening are left in contact with the tissues of the ear and from them the blood vessels and other living tissues invade the chamber until they form a complete new layer.

This new layer, only two-thousandths of an inch in thickness, is quite transparent and it is necessary only to place the "window" under the microscope to see with the most extraordinary clearness at 1,000-fold magnifications the minutest elements—the individual cells—of which animals are made.

Moreover, since the new tissue is permanent and the chambers can remain in place for months without causing any discomfort to the animal, it is possible to make repeated observations and careful studies not only of the exact way in which the new growth occurs, but also of the way the tissue elements behave in conditions of health and disease.

Heretofore there had been no satisfactory region in a warm-blooded animal in which such fine details could be studied on living, growing cells inside the body. Investigators depended either on cutting thin pieces of dead tissue, staining them in various ways, and placing them on glass slides in order to study tissues and cells under the microscopes, or on keeping small pieces of tissue alive in "tissue cultures" outside the body.

Mrs. Clark Helped

The development of the new method grew out of a number of research projects in which Dr. Eliot R. Clark, professor of anatomy at the university and director of the anatomical laboratory had engaged, and in many of which he collaborated with his wife, Eleanor L. Clark.

Dr. Clark's studies had been devoted to living structures in the lower forms of life, such as fish and tadpoles, cold-blooded animals in whose transparent tail fins or gills it is possible to see with great clearness the finest details of cell structure. It was Dr. Clark's desire to extend these studies to higher animals, and at his suggestion and under his direction the preliminary experiments were carried out by Dr. J. C. Sandison, of the department of anatomy.

These experiments demonstrated the practicability of the "window" method, and the Rockefeller Foundation subsequently made a grant of \$15,000 a year for five years for the rapid perfection and extension of the method.

Aided by this grant, the technique of constructing the chambers and inserting



DR. ELIOT R. CLARK

Who prompted and assisted in the development of a new technique which for the first time reveals living tissue for study under the microscope over a long period

them has been developed by Dr. Clark and his wife, Dr. R. J. Williams and other research workers in the laboratory to such a point that a wide variety of studies in different fields of medicine may be carried out by this method.

Various modifications of the chambers have been devised to meet the solution of different types of problems and some of these types have been standardized. One such type, instead of allowing a space for the growth of new tissues, provides for the retention of some of the original tissue with its small blood vessels still circulating in a thin space between transparent walls.

Another type has a small hole in the bottom of the chamber for the purpose of "transplantation" of tiny bits of tissue from other parts of the body so that studies similar to those carried out by the many workers who are using the famous "tissue culture" method devised by Dr. R. G. Harrison, of Yale, may now be pursued on living cells inside the animal body.

Moving Pictures Successful

Successful moving pictures of the circulation of the blood in these chambers have recently been taken by Dr. E. A. Swenson, a member of the staff of the laboratory of anatomy.

Studies which have already been

made by this method have yielded a wealth of new facts regarding the way in which the minute elements of the body grow and behave in conditions of health, and enough preliminary observations also have been carried out to establish the value of the method in the study of diseased conditions.

The process employed in the "window" method was demonstrated to physicians from this country and abroad last week during the celebration of medical progress held in the University of Pennsylvania's School of Medicine.

Science News Letter, October 18, 1930

ASTRONOMY

Uranus and Neptune Without More Moons

IF THERE are any more satellites of the planets Uranus and Neptune, in addition to those already known, they are exceedingly faint. For many years four moons of Uranus have been known and one of Neptune. With the aid of photographs made with the 60-inch reflecting telescope of the Mt. Wilson Observatory, William H. Christie has made a search for additional satellites of these planets, giving time exposures of one to three hours' duration. However, no such object has been found, and so Mr. Christie concludes that if there are any additional satellites, those of Uranus are not brighter than the 19th magnitude and of Neptune not brighter than 18.5 magnitude.

Science News Letter, October 18, 1930

PHYSICS

Atomic Projectiles Sought to Release Energy of Atom

California Physicists Find a Way to Speed Up Hydrogen Proton Without High Voltage Vacuum Tube Troubles

THE PRODUCTION of atomic projectiles of tremendous speed, capable of smashing the hearts or nuclei of gold and other elements, perhaps transmuting them into other substances or releasing large quantities of atomic energy, is promised by a new experiment which has been reported to the National Academy of Sciences by a young University of California professor of physics, Dr. Ernest O. Lawrence, and his associate, Dr. N. E. Edlefsen.

It has long been the desire of scientists to have swiftly moving particles of high energy with which to bombard the compact and unknown center of atoms but the difficulties of producing high voltages of a million or more, necessary to generate such energies in an X-ray or vacuum tube, have stood in the way.

Protons Given Kicks

Professor Lawrence has devised a method for speeding up the proton, or heart of the hydrogen atom, in such a way that the troubles of operating

vacuum tubes at such high potentials are avoided. Although he has not yet produced the high speed protons, with energies of million volt-electrons or so that are needed, his apparatus has operated successfully and he believes that it is merely a matter of time and effort before the desired high speed protons are produced.

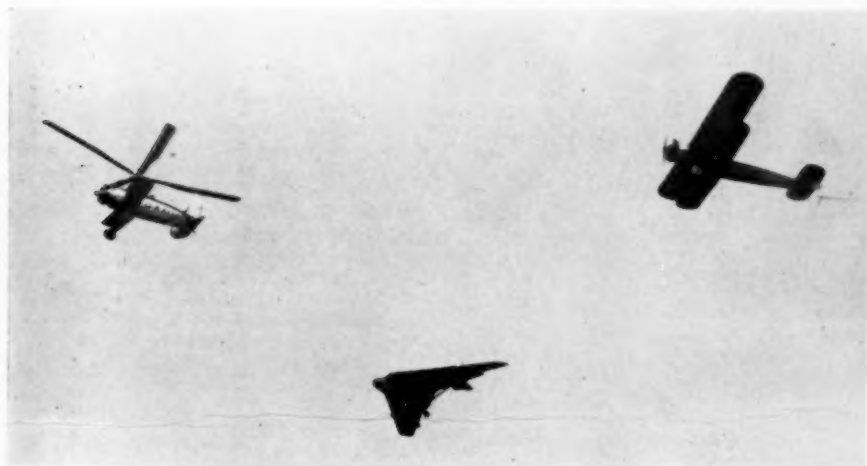
Protons are chased around electrically in such a way that they are given repeated kicks that constantly increase their speed and energy and finally they shoot out of the apparatus to attack the heart of another element.

Hydrogen is stripped of its electrons leaving the nucleus or proton. An electric current seizes the proton and jerks it across the space between semicircular hollow plates. As the proton goes to the other side it is bent in its path by a strong magnetic field acting perpendicularly and just at that time the electric current is reversed in direction and the proton is pulled back again. This happens over and over again in the vacuum in such a way that the proton is accelerated in a spiral path and finally is flung out with high energy. Oscillations of 10,000 volts and 20 meters wavelength, impressed on plates eight inches in diameter in a strong magnetic field are necessary and it is believed that these can be achieved without great difficulty.

Eagerly Awaited By Scientists

Scientists eagerly await the day when they will be able to test the current speculation that quantities of energy are locked up in the heart of the atom. This idea, seriously advanced by leading physicists, has been the basis of fiction and drama that pictured successful bombardment as starting a progressive conversion of matter into energy that destroyed the world in a gigantic explosion. The idea that matter and energy are interchangeable is a consequence of the Einstein theory and the newer physics.

Science News Letter, October 18, 1930



STRANGE PLANES IN FORMATION

Left to right—The windmill autogiro, which can be throttled down to 30 miles an hour; and the tailless pterodactyl and the slotted wing Handley-Page, both of which greatly reduce the stalling hazard. These are "freak" airplanes now, probably in the same way the Wright brothers' plane was a freak at Kitty Hawk a quarter of a century ago. They were photographed together at a display of the Royal Air Force in England.

PSYCHOLOGY

What Edison's Trick Questions Tell Him

By MARJORIE VAN DE WATER

WHEN Edison made his latest invention, that puzzling question that he first tried on his 49 brightest boy candidates for coveted Edison scholarships, he was really bent on testing character.

Here is the way the question ran:

"You are the head of an expedition which has come to grief in the desert. There is enough food and water left to enable three people to get to the nearest outpost of civilization. The rest must perish. Your companions are—

1. A brilliant scientist 60 years old.
 2. Two half-breed guides, ages 58 and 32.
 3. The scientist's wife—interested mainly in society matters—age 39.
 4. Her little son, age 6.
 5. The girl you are engaged to marry.
 6. Your best friend, a young man of your own age who has shown great promise in the field of science.
 7. Yourself.
- "Which would you choose to live and which to die? Give your reasons."

Psychologists agree that there is no one best answer to such a test query. Probably no two of them would answer alike.

But to score 100 per cent. the question must receive a definite answer. The important thing is to answer the problem and be able to defend your answer. Such a response as: "We'd all get rescued in time" or "I don't know" would score a big, fat zero. In other words, Edison's boy genius must be able to make up his mind. He must also display some ingenuity.

One of the questions in the Edison test last year was of the same sort. How would you answer this one:

"If you were to inherit \$1,000,000 within the next year, what would you do with it?"

Probably there are as many correct answers to that question as there are dollars mentioned. But any answer given would probably satisfy the mind of the wizard—can the boy make a plan without taking a week to think it over?

Questions With Many Answers

Here are some more of the same kind:

"What new discovery or invention do you believe would be the greatest benefit to mankind? Why?"

"What, in your opinion, should be done to improve the airplane?"

Ever since psychological tests were used so successfully to sort out the

Can character be measured?

Psychologists say yes, although they admit that the way has not been perfected so far. Perhaps Edison's test questions are a long step in the right direction, which only the final success or failure of winners of his nationwide scholarship will tell.

drafted personnel of the army in the World War, psychologists have been working trying to work out some means of testing character. Mental tests are being used in all the big industries today. Executives find that it is much better to give an applicant for a job a test than it is to ask his friends whether he is a bright boy.

But for most jobs it is not enough that the boy be bright. He must be honest; he must have backbone; he must be able and willing to stick to a job; he must be able to get on with his fellow workers and his foreman or chief.

Can such things be measured? Psychologists say yes, although they admit that the way has not been perfected so far. Perhaps Edison's test questions are a long step in the right direction. Only time, and the final success or failure of his scholarship winners will prove that to the satisfaction of cold science.

Other steps have been taken by psychologists and are now being tried out in laboratories on all sorts of people, good and bad. Some are giving excellent results; some not so good.

The following questions, for example, are not at all what they seem to be—but suppose you try them first; get some friend to take them, but don't tell him about the joker between the lines. It is only necessary to underline the answer to each question.

1. Are you ever rude to members of your family? Yes No
2. Are you always on time for your appointments? Yes No
3. Are you broad-minded? Yes No
4. Have you ever laughed at

another person's misfortune, however slight?

Yes No

5. If a ticket agent gave you ten cents too much change, would you miss a train to return it?

Yes No

6. If a telephone operator gave you the number, and then returned your nickel by mistake, would you drop it back in the box?

Yes No

7. Do you always pick up papers you see strewn carelessly in the street?

Yes No

8. If you like classical music on the radio and your wife, or husband, likes jazz, do you always play the jazz?

Yes No

9. Do you always pay for personal calls you make on the office telephone?

Yes No

10. Do you always return borrowed books within two weeks?

Yes No

Test Character of Children

Questions like these are being used by psychologists to test the character of children, but not to find out whether they would actually do these things. If all the questions were answered "yes" with the exception of numbers 1 and 4, then the child would be judged "a pious fraud." It is seldom, indeed, that we find such perfection.

Here is another test where the "nigger in the woodpile" is more carefully hidden.

Read the following list of books and authors carefully and indicate which books you have read. Be sure to include only those you have actually read, not those you have merely heard discussed.

1. Charles Dickens—*Oliver Twist* Yes No
2. Ernest Hemingway—*Farewell to Arms* Yes No
3. Rev. Arthur Stowe—*Tree of Life* Yes No
4. Mrs. Gaskell—*Cranford* Yes No
5. Clyde Wilton—*Romance of Architecture* Yes No
6. E. M. Hull—*The Shiek* Yes No
7. Norman Douglas—*South Wind* Yes No
8. Robert Stevens—*The Usurper* Yes No
9. Lt. Percival Ogden—*Espionage* Yes No
10. Leo Tolstoi—*Anna Karenina* Yes No

Perhaps you feel discouraged because you have had to put "no" after so many titles. Don't worry! It works the other way. The person who answers "yes" to too many has given himself away as one with extraordinarily poor memory or as a deliberate deceiver, because many of the titles belong to no books that have

Is it worth your while to direct the fate of a mythical stranded expedition?



ever been written. Of course you have never read them! Numbers 3, 5, 8 and 9 are the false titles.

And here is another way that is used to catch the fellow who will cheat if given a chance. An ordinary examination is given. The subject does not matter. Perhaps it may be spelling. Then the papers are collected and another test is given.

Then, without the knowledge of the people taking the examination, the answers of each one are copied off by the examiner. Later on the papers are returned to the individuals with a list of correct answers and the request that they score their own papers. The examiner leaves the room, and plenty of opportunity is given to erase answers and change them so as to increase the score.

The conscientious boy will, of course, leave his answers just as they were first handed in—right or wrong, but some boys will take a surprising amount of trouble in erasing even ink, especially if a prize is at stake.

Persistence Definitely Measured

Persistence is another quality that psychologists have found definite means for measuring. In fact, this is much more easily tested than honesty. Just give a person a particularly long and tedious task like the copying of a large table of figures or copying longhand the names in a telephone book. Time him, and see whether he keeps up an even rate, or whether he soon slows down and begins to look out of the window.

He may even give it up after a short time.

Some psychologists believe that the chief value of the crossword puzzle is as a test of persistence. Really, any sort of intricate puzzle, either mechanical or mental, is excellent for this purpose.

Here is one that has been used:

"Four boys arrived at a river and found a boat that would carry just 200 pounds but no more. None of them knew how to swim, so they had to manage to cross in a boat. Tom weighed 200; Jim weighed 200; Bill weighed 100 and Dick weighed 100. How did they get across?"

Yes, there is a way of working it out, but as a matter of fact it would serve the purpose just as well if there were no answer, just so that fact was not obvious.

Mechanical puzzles, such as the familiar wire ring to be separated from the larger triangle, or the irregular blocks of wood to be fitted into a seemingly impossible design, which may be found in the Japanese, magic or souvenir store, serve a double purpose of testing both persistence and mechanical ingenuity.

If your boy will work at one of these little tricks by the hour until he has solved the problem, you can be sure that he has one of the traits that Edison regards as most important to business success—the "will to work."

Another type of persistence is the ability to concentrate on a task in the face of various distractions, whether of an annoying or amusing character. This is a trait that is very necessary in business. The person who can work only when alone and undisturbed and uninterrupted will find success a difficult matter, for such ideal conditions simply do not exist for the most part.

Testing Distractibility

Here are several ways in which this trait may be tested. The first is to give a routine test of any kind; arithmetic is a good subject. For ten minutes you are allowed to work quietly.

All at once a dog or a mouse is let loose in the room. Or someone comes in and starts to read loud. Can you keep your mind on your work and make a good score in the second ten minutes? Psychologists have discovered that most people are more easily distracted by something which frightens or startles them than by anything which merely annoys, angers or embarrasses them.

A simpler way of measuring the same trait of distractibility is to see how well people can keep at a routine task like the adding of figures, while an interesting puzzle picture is kept in tantalizing fashion before their eyes.

Many people are very easily distracted. It is because of this weakness of human nature that advertisers can afford to pay the thousands of dollars charged for space in our popular magazines. The reader's eye will stray from even the most interesting story to the gay-colored picture on the facing page.

ASTRONOMY

**Pluto Appears Again
In Predicted Place**

VISIBLE for the first time since May, the transneptunian planet Pluto has been observed recently by Dr. George van Biesbroeck, astronomer at the Yerkes Observatory, Wisconsin. His three measured positions are found to fit exactly the orbit computed by Drs. E. C. Bower and F. L. Whipple of the Students Observatory at the University of California.

The Earth will be on a line between the Sun and Pluto early in January. Even at this time of close approach, Pluto will be so far distant from the Earth that its light will require a quarter of a day to reach us, though traveling at the rate of 186,000 miles per second. Pluto itself moves so slowly that it requires 20 years to pass through the zodiacal constellation of Gemini, the twins, in which it is now sojourning.

Reappearing from behind the sun, Pluto has fully confirmed the accuracy of the orbit computed by Drs. Bower and Whipple from the 100 observations of 1930, as well as those found on Mt. Wilson plates of 1919 and Yerkes Observatory plates of 1921 and 1927. Much of the success of their calculation was attained by considering the masses of the eight other large planets concentrated at the center of the Sun. This innovation in orbit theory was necessitated by Pluto's unique position on the extreme limits, so far as is known, of the solar system.

Although the orbits of the eight major planets all lie in practically the same plane, the path of Pluto makes an angle of 17 degrees with this plane. This fact explains why the transneptunian planet escaped discovery for so many years in spite of careful search.

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PHYSIOLOGY

**Some Rats Are Born
With Superior Abilities**

RATS differ in the readiness with which they learn to choose the correct path leading to food, and this difference seems to be due to native ability, not to the amount of previous practice.

Experiments leading to this conclusion were conducted by Prof. Joseph G. Yoshioka of the Institute of Juvenile Research, Chicago, and will soon be reported by him in the *Journal of Comparative Psychology*.

Prof. Yoshioka first allowed the rats to reach food by following either of two runs of equal length. He found that the majority of the rats showed a definite preference for either the right or left path. Some of the rats therefore had more practice on the left path, some became more used to the right.

Prof. Yoshioka then took away the food from the end of one of the runs. He found that the rats differed considerably in the ease with which they learned to take the new route, but that the number of times they had chosen that route before did not apparently affect their rate of learning.

Science News Letter, October 18, 1930

ORNITHOLOGY

**Devious Courses Often
Leads Birds South**

BIRDS do not always fly south in autumn, sometimes they fly east or west. In a Science Service radio talk, prepared by Dr. Paul G. Redington, chief of the U. S. Biological Survey, and, in the absence of Dr. Redington, read by Dr. Edward A. Preble, senior biologist of the Survey, over a nation-wide network of the Columbia Broadcasting System, it was stated that birds do not always fly over the shortest route when on their way to winter quarters.

"In general, birds fly south in autumn, but a study of migration reveals many exceptions to this rule," said Dr. Redington. "Certain species may take a general southward course for hundreds of miles, and then turn at right angles eastward or westward to some favored wintering or resting ground. In completing a trip of several thousand miles they may make a long journey by easy stages, or they may stop at only a few well-stocked feeding grounds. Thus the blue goose, nesting solely in a rather limited area recently discovered in Baffinland, stops regularly at only a few places in the southern part of Hudson Bay during its long journey southward to the Louisiana marshes, where nearly all its legions winter.

"Some species nest only in the freshwater marshes of the far interior, but in winter cling closely to the ocean. Some pass over the highest of mountain ranges in their chosen paths. Some may gather during both their breeding and their wintering seasons in restricted areas thousands of miles apart. Many follow different routes in their northward and southward journeys."

Science News Letter, October 18, 1930

IN SCIENCE

BACTERIOLOGY

**Clean Skin Is Found to Kill
Dread Disease Germs**

HUMAN skin is more than a mechanical protection against infectious diseases. It is an efficient external organ for killing pathogenic microorganisms, or disease germs.

Drs. Charlotte Singer and Lloyd L. Arnold of the Research Laboratory, State Department of Health, Chicago, applied broth cultures of disease-producing bacteria to skin surfaces. They found that within ten minutes from 90 to 95 per cent. of all the bacteria were killed. The germs of typhoid fever were among the bacteria most readily killed by human skin.

These results, however, were obtained only with clean skin. On dirty or greasy skins the same bacteria survived for many hours. The finger-nail region was deficient in bacteria-killing power.

Science News Letter, October 18, 1930

ENTOMOLOGY

**Sap Protects Cuban Wood
From Ravenous Termites**

SOME peculiar quality characterizing native woods saves structures made of Cuban lumber from attack by white ants or termites which destroy woods imported to that country.

In the Episcopal Cathedral in Havana is a new and very beautiful organ. In order to insure its lasting for generations to come, the wood used is native mahogany and cedar, which was shipped from Cuba to the United States for manufacture of the organ.

A lumber man in Havana states that if wood in Cuba is cut while the sap is in the wood, then dried, it will not be troubled by termites but that if it is cut when dry, it is not safe from the pests. From this circumstance he concluded that native woods in Cuba contain some sort of oil which is disagreeable to termites.

Science News Letter, October 18, 1930

NEW FIELDS

ARCHAEOLOGY-SURGERY

Archaeologists Find Patient Peruvian Surgeons Lost

(See Front Cover)

ONE of the most interesting of the many ancient skulls that have been brought out of Peru bears what is probably the earliest known gauze compress—certainly the earliest surgical dressing of the kind that has been discovered on this continent. The bold cranial surgery of the Peruvian medicine men has long been known, both in the treatment of head wounds and in trepanning, probably for ceremonial purposes. But here was a case that defeated their skill; the patient died, and was laid away with the bandage still in place, tied with cords of llama hair.

The skull was collected by Dr. Ales Hrdlicka, of the Smithsonian Institution.

Science News Letter, October 18, 1930

ARCHAEOLOGY

110 Indian Sites Unearthed In New England Cities

AN archaeological expedition which has spent the summer digging in back yards and orchards, gardens and public parks of busy New England towns has unearthed 110 sites occupied by Indians. These 110 sites, placed on government maps for the first time, are mostly prehistoric, Prof. Warren K. Moorehead of Phillips Academy, Andover, stated in announcing the results of the survey.

The expedition set out to find what traces remain of the Indians who lived in the Merrimack Valley in Massachusetts and New Hampshire. The expedition labored under great disadvantages because cities and towns occupy all the principal Indian sites, Professor Moorehead explained. But among the 400 land owners visited, only four refused permission for excavation, which the archaeologist pronounced a remarkable record. More than 13,000 test pits were sunk in sites that appeared to be Indian.

"Several important conclusions were reached," Professor Moorehead stated.

"Contrary to general belief, there appear to be no large Indian cemeteries, and very few small ones in the entire valley. During the entire period of the survey, but three decayed skeletons were found, not one of which could be preserved. Information obtained from older citizens and from records indicate that not more than 50 skeletons have been discovered in the entire valley. This leads to the conclusion that burials were made in small wooden structures upon the surface."

The art of the Indians of the Merrimack Valley is rather low, not equaling that of the Indians of the Penobscot Valley in Maine, Professor Moorehead stated. Many of the objects found appear to be very old and heavily patinated. Some of the objects indicate contact with tribes in New York state or Pennsylvania.

Notwithstanding popular tradition, there are no mounds and apparently no rock shelters, he said.

Science News Letter, October 18, 1930

ARCHAEOLOGY

Double-Walled Indian Fort Preserved in Canada

THE SOUTHWOLD Earthworks in Ontario, declared by Canadian archaeologists to be the only double-walled Indian fortification existing in America, have been acquired by the Canadian Government and set aside as a national historic site.

The new reservation contains the ruins of a unique double-walled fort erected by the Attiwandaronk or Neutral Nation of Indians. The fort itself was protected by a double line of earthworks which completely enclosed it. Between the walls lay a moat 30 feet wide. It is believed that the superstructure of the earthworks was a palisade of high sharpened logs.

This old stronghold is thought to be the place at which the Attiwandaronks made their last desperate stand against the Iroquois Indians, who finally drove them from Ontario about 1650. Although these Indians were visited by French traders, the ruins have yielded nothing that would indicate contact with European civilization. Flint arrowheads and bone needles of the most primitive type have been unearthed.

Science News Letter, October 18, 1930

PUBLIC HEALTH

More States Report Cases In Paralysis Gain

THE EXPECTED drop in the number of cases of infantile paralysis has failed to materialize. For the week ending October 4, 647 cases were reported to the U. S. Public Health Service in Washington. This is an increase of 53 cases over the number reported the week before. The increase has come chiefly in states which heretofore have not reported many cases, so that the outbreak is now nearly nation-wide.

The highest figure for the week was reported by Kansas with 87 cases. New York reported 50, Nebraska 60, and Ohio 75. The largest gains, however, have been in South Dakota, Nebraska, Wyoming and Indiana. These states gained from 10 to 24 cases each over the total number reported the previous week. Southern states, particularly those in the South Atlantic group, have continued to be fairly free from the disease.

Apparently no widespread outbreak of this disease is occurring in other countries. From Denmark, Sweden and Holland a few cases have been reported during the last month, but the figures are not considered above the normal for these countries. In Alsace-Lorraine the disease is disappearing. Other countries have not reported any cases recently.

Health officials continue their warnings to parents to keep children away from sick people and from strangers. No further precautions can be advised, because the exact way in which the disease is passed from one person to another is not known.

Science News Letter, October 18, 1930

ZOOLOGY

Herds of Wild Elk Block Traffic on Highway

HERDS of wild elk from their haunts in the foothills of the Olympic mountains have moved down to graze along the highway to Lake Quinault. So many of the large animals cross and re-cross the road as to frequently halt automobile traffic. Unlike the elk herds in Yellowstone National Park, the Roosevelt elk of the Olympics have abundant winter pasturage unhampered by heavy snows. They have increased until there is a possibility of an open season during the autumn of 1931.

Science News Letter, October 18, 1930

BIOLOGY

"A Classic of Science" --- Man's First Glimpse Of Microbes

"A thousand times smaller than the eye of a big louse" were the tiny animals seen through Leeuwenhoek's microscope.

Which ends were their heads, their feet, their tails? The observations were duly recorded before the water containing them was "flung away" and the account sent to the Secretary of the Royal Society in London. Not for two hundred years was it suspected that they have any importance.

OBSERVATIONS, communicated to the Publisher by Mr. Antony van Leeuwenhoek, in a Dutch Letter of the 9th of Octob. 1676. here English'd: Concerning little Animals by him observed in Rain- Well- Sea- and Snow-water; as also in water wherein Pepper had lain infused. In Philosophical Transactions [of the Royal Society] Vol. XII. For the Year of our Lord, M.DC.LXXXIII. Oxford, 1683.

IN THE YEAR 1675, I discover'd living creatures in Rain water, which had stood but few days in a new earthen pot, glazed blew within. This invited me to view this water with great attention, especially those little animals appearing to me ten thousand times less than those represented by Mons. Swammerdam, and by him called *Waterfleas* or *Waterlice*, which may be perceived in the water with the naked eye.

The first sort by me discover'd in the said water, I divers times observed to consist of 5, 6, 7, or 8 clear globuls, without being able to discern any film that held them together, or contained them. When these *Animalcula* or living Atoms did move, they put forth two little horns, continually moving themselves: The place between these two horns was flat, though the rest of the body was roundish, sharpening a little towards the end, where they had a tayl, near four times the length of the whole body, of the thickness (by my microscope) of a Spiders-web; at the end of which appear'd a globul, of the

bigness of one of those which made up the body; which tayl I could not perceive, even in very clear water, to be mov'd by them. These little creatures, if they chanced to light up on the least filament or string, or other such particle, of which there are many in water, especially after it hath stood some days, they stook intangled therein, extending their body in a long round, and striving to dis-intangle their tayl; whereby it came to pass, that their whole body leapt back towards the globul of the tayl, which then rolled together Serpent-like, and after the manner of Copper- or Iron-wire that having been wound about a stick, and unwound again, retains those windings and turnings. This motion of extension and contraction continued a while; and I have seen several hundreds of these poor creatures, within the space of a grain of gross sand, lye fast cluster'd together in a few filaments.

I also discover'd a *second* sort, the figure of which was oval; and I imagined their head to stand on the sharp end. These were a little bigger than



ANTONIUS A. LEEUWENHOEK

the former. The inferior part of their body is flat, furnished with divers incredibly thin feet, which moved very nimbly, and which I was not able to discern till after several Observations. The upper part of the body was round, and had within, 8, 10, or 12 globuls, where they were very clear. These little Animals did sometimes change their figure into a perfect round, especially when they came to lye on any dry place. Their body was also very flexible; for as soon as they hit against any the smallest fibre or string, their body was bent in, which bending presently also jerked out again. When I put any of them on a dry place, I observ'd, that changing themselves into a round, their body was raised pyramidal-wise with an extant point in the middle, and having lain thus a little while with a motion of their feet, they burst asunder, and the globuls were presently diffus'd and dissipated, so that I could not discern the least thing of any film, in which the globuls had doubtless been inclosed: And at this time of their bursting asunder I was able to discover more globuls than when they were alive.

But then I observ'd a third sort of little Animals, that were twice as long as broad, and to me eye yet eight times smaller than the first. Yet for all this, I thought I discern'd little feet, whereby they moved very briskly, both in a round and streight line.

There was, further, a *fourth* sort, which were so small, that I was not able to give them any figure at all. These were a thousand times smaller than the eye of a big Louse: For I judge, the *axis* of the eye of such a Louse to be more than ten times as long as the *axis* of any of the said little

HOW GEYSERS WORK

Solved by Bunsen, the flame chemist, on his vacation in

ICELAND

Next Week's Classic of Science,
The 138th Classic

creatures. These exceeded all the former in celerity. I have often observ'd them to stand still as 'twere upon a point, and then turn themselves about with that swiftness, as we see a Top turn round, the circumference they made being no bigger than that of a small grain of Sand; and then extending themselves streight forward, and by and by lying in a bending posture

I discover'd also several other sorts of Animals, but these were very big respectively; of which I intend not to speak here; only this, that they were generally made up of such soft parts, as the former, they bursting asunder as soon as they came to want water.

Observ. II.

The 26. May, it rained hard; the rain growing less, I caused some of that Rain-water, running down from the house-top, to be gather'd in a clean Glass, after it had been washed two or three times with the water. And in this I observ'd some few very little living creatures, and seeing them, I thought they might have been produced in the leaden-gutters in some water, that had there remain'd before.

Observ. III

On the same day, the Rain continuing, I took a great Porcelain-dish, and exposed it to the free Air upon a wooden vessel, about a foot and a half high, that so no earthy parts, from the falling of the Rain-water upon that place, might be spatter'd or dashed into the said dish. With the first water that fell into the dish, I washed it very clean, and then flung the water away, and receiv'd fresh into it, but could discern no living creatures therein; only I saw many irregular terrestrial parts in the same.

The 30. of May, after I had, ever since the 26th, observ'd every day twice or thrice the same Rain-water, I now discover'd some, yet very few, exceeding little Animals, which were very clear.

The 31th of May, I perceived in the same water more of those Animals, as also some that were somewhat bigger. And I imagine, that many thousands of these little Creatures do not equal an ordinary grain of Sand in bigness: And comparing them with a Cheese-mite (which may be seen to move with the naked eye) I make the proportion of one of these small Water-creatures to a Cheese-mite, to be like that of a Bee to a Horse: For, the circumference of one of these little Animals in water, is not so big as the thickness of hair in a Cheese-mite.

Observ. IV.

June 9th, having received, early in the morning, some Rain-water in a dish, as before, and poured it into a very clean Wine-glass, and exposed it about 8 of the clock in the morning to the Air, about the height of the third story of my house, to find, whether the little Animals would appear the sooner in the water, thus standing in the Air:

Observing the same accordingly the 10th of June, I imagin'd, I saw some living creatures therein; but because they seem'd to be but very few in number, nor were plainly discernable, I had no mind to trust to this observation.

The 11th of the same month, seeing this water move in the Glass from a stiff gale of wind (which had blown for 36 hours without intermission, accompanied with a cold, that I could very well endure my Winter-cloaths.) I did not think, I should then perceive any living creatures therein; yet viewing it attentively, I did, with admiration, observe a thousand of them in one drop of water, which were of the smallest sort, that I had seen hitherto.

The 12th of June, the wind being at west, the Sun shining with interloping clouds, I view the same Rain water, and found the fore mention'd little Animals

so plentifully in the water which I took up from the surface, that one or two thousand, in one single drop did not make up their number.

The 13th of the same month, viewing the same water again, I found, besides the Animals already noted, a sort of creatures, that were eight times as big as they, of almost a round figure: And as those very small *animalcula* did swim gently among one another, moving like as Gnats do in the Air; so did these bigger ones move far more swiftly, tumbling round as 'twere, and then making a sudden downfall.

The 14th of June I did find these very little creatures in no smaller number. The 16th, I saw them as before; and this water, which had been, in all, 1/6 of a pint, being now more than half dried up, I flung it away. . . .

Observ. VI.

The 17th of this month of June it rained very hard; and I caught some of that Rain-water in a new Porcelain dish, which had never been used before, but found no living creatures at all in it, but many terrestrial particles, and, among others, such as I thought came from the smoak of Smiths coals, and some thin thrids, ten times thinner than the thrid of a Silk-worm, which seem'd

Go on this "Trip To The Moon"

HEAR the announcer in his bomb-proof shelter five miles from the spot dramatically describe the take-off of the two billion dollar space ship from the Arizona desert. Get reports of the craft's progress direct from the world's biggest observatories. Watch her arrival on the moon through the great 500-inch Mt. Wilson telescope . . . and hear a prominent astronomer in the ship on the moon, talking to earth along a beam of light, tell what he sees on the surface of our satellite.

The astronomer is Dr. John Q. Stewart, associate professor of astronomical physics at Princeton University, who has written and will take the leading part in this "play by play" radio report of a future journey to the moon.

THIS IS not a fantastic dream. It is a concrete description by a well-known astronomer, based on his careful studies of man's progress, of an event that may take place about the year 2050. You will be thrilled, as your great-great grandchildren will be when they hear described and see television pictures of the real event.

Presented by SCIENCE SERVICE

FRIDAY, OCTOBER 24, 3:45 p. m. Eastern Standard Time

Over a Nation-wide Network of 39 Stations of

The Columbia Broadcasting System

to be made up of globuls; and where they lay thick upon one another, they had a green colour.

The 26th, having been eight days out of Town, and kept my Study shut up close, when I was come home and did view the said water, I perceived several *animalcula*, that were very small. And herewith I desisted from making at this time any further Observations of Rain-water.

Mean time, this Town of *Delft* being very rich in water, and we receiving from the River of *Maase* fresh water, which maketh our water very good; I viewed this water divers times, and saw extream small creatures in it, of different kinds and colours; and even so small, that I could very hardly discern their figures: But some were much bigger, the describing of whose motion and shape would be too tedious: This only I must mention here, that the number of them in this water was far less than that of those, found in Rain-water; for if I saw a matter of 25 of them in one drop of this Town water, that was much.

In the open Court of my house I have a well, which is about 15 foot deep,

before one comes to the water. It is encompassed with high walls, so that the Sun, though in Cancer, yet can hardly shine much upon it. This water comes out of the ground, which is sandy, with such a power, that when I have laboured to empty the well, I could not so do it but there remained ever a fouts depth of water in it. This water is in Summer time so cold, that you cannot possibly endure your hand in it for any reasonable time. Not thinking at all to meet with any living creatures in it, (it being of a good taste and clear) looking upon it in *Sept.* of the last year, I discover'd in it a great number of living animals very small, that were exceeding clear, and a little bigger than the smallest of all that I ever saw; and I think, that in a grain weight of this water there was above 500 of these creatures, which were very quiet and without motion.

In the Winter I perceived none of these little animals, nor have I seen any of them this year before the month of *July*, and then they appear'd not very numerous, but in the month of *August* I saw them in great plenty.

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DR. J. W. MARDEN

And his new sun lamp developed in the laboratories of the Westinghouse Company. It can be adapted for use in an ordinary electric light socket.

ENGINEERING

New Sun Lamp Resembles Ordinary Electric Light

SUNLIGHT has become almost as easy to reproduce as the artificial illumination of the electric lamp. This is made possible by a new type of lamp which, although it closely resembles the common lamp and is almost as readily used, gives light as beneficial as that from a midsummer sun. It was described in Richmond, Va., by Dr. J. W. Marden, research engineer of the Westinghouse Company, before the annual meeting of the Illuminating Engineering Society.

"This new lamp," Dr. Marden said, "is designed to send out small quantities of healthful ultraviolet rays when it is burned in conjunction with an ordinary electric lamp or a small resistance. Consuming only 25 watts, it produces a very mild sunburn or redness of the skin on one's arm held about five inches from the lamp for a period of about 15 or 20 minutes."

The lamp is of the low pressure mercury glow discharge type and will soon burn out if full house voltage, usually 110 volts in the United States, is applied to it. Hence a transformer, a special resistance or another lamp must be used with it. It is thought that its most convenient application in the home will be in a double socket with an ordinary illuminating lamp.

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ANTHROPOLOGY

If Elected, You Must Serve Old Tzapotec Democracy

AN INDIAN democracy, in which officials serve without pay and are deprived of their citizenship if they refuse political office, has been discovered among an isolated tribe, the Tzapotecs of Mexico, by Dr. Oscar Schmieder, of the University of California.

The Tzapotec system of government by and for the people appears to be one of the oldest democracies in the world. Magnificent stone buildings erected by early generations of Tzapotecs were falling into ruins when Columbus discovered America. Yet the customs of the tribe have changed very little, owing to their secluded home in the high valley of Tlacolula.

Mitla, chief town of the Tzapotecs, holds elections January first and chooses its officials for one year. To refuse to serve is literally to become a man without a country. Married men over 18 may vote, but bachelors cannot vote until they are 21.

The young men take turns serving on

the police force, for two weeks at a stretch. All contribute labor for building schools and other public works. A man arrested for drunkenness must work out his fine.

When a young Tzapotec decides which of the village maidens he wishes to marry, he goes, not to the girl or to her parents, but to a professional match-maker who arranges the marriage to the satisfaction of all concerned.

Each family has a plot of arable land. The communities also own isolated patches of ground in the mountains which any one may farm.

While farming is the chief occupation and corn and beans the staple crops, the men weave woolen blankets or serapes on ancient looms and make long trips to the cities to sell their products.

The women may help their husbands in the fields but their chief work is in the house, or its small garden and orchard.

ASTROPHYSICS

Sun's Ultraviolet Light Flares Cause Magnetic Storms

Dr. Hulburt Gives Latest Views on Magnetism of Earth And How it is Influenced by Radiation From Sun

A FLARE of ultraviolet light from the sun is the cause of magnetic storms which sometimes disrupt radio communication, according to Dr. Edward O. Hulburt, physicist of the U. S. Naval Research Laboratory in Washington. Dr. Hulburt described the mechanism of this effect when speaking in a radio talk given by Science Service over a nation-wide network of the Columbia Broadcasting System.

The entire earth constitutes a huge dynamo, according to this theory. The drifting of charged atoms, or ions, around the earth in the atmosphere some hundred miles above the earth's surface produces an electric current flowing in an eastward direction. This current, it is calculated, amounts to about three million amperes, and, like any flowing electric current, produces a magnetic field. Most of the earth's magnetism, about 98 per cent., comes from inside the earth, but the remaining two per cent. is the result of this current in the high atmosphere, Dr. Hulburt stated.

"A Small Affair"

"A magnetic storm," he continued, "is a small affair from some standpoints, for example, it is too small to trouble appreciably a mariner's compass. It causes, however, a tremendous wiggle in the curve which is traced continuously by the sensitive instruments of the magnetic observatory. And what perhaps is of more practical interest, the short wave wireless signals are often found to be wiped out and the short wave communication channels rendered inoperative during a magnetic storm. Magnetic storms differ from ordinary storms in that they occur at the same instant over the entire earth. They may last a few hours or several days; there may be only 10 or 20 storms during some years and as many as 50 or 100 during other years.

"It has long been known that most magnetic storms are due to an outburst of some sort from the sun, but just what the eruption is like or where it is

on the solar surface has not yet been discovered. The surface of the sun is like a burning prairie and is covered with countless flickering, blazing flames. Outbursts and upheavals of flaming gases occur continually, but no particular type of eruption has yet been identified with certainty as the cause of terrestrial storms. Again it has been the behavior of the short radio waves which has given a clue to what happens on the earth during a magnetic storm, and what happens in a storm in the high atmosphere. To make a long story short the general idea of what takes place is as follows:

"The solar outburst is a flare of ultraviolet light which usually blazes up to full intensity in a few minutes, or an hour, and dies away more or less

irregularly in a day or so. The flare is probably difficult to see because most of its light, being in the far ultraviolet part of the spectrum, is absorbed in the high atmosphere and does not penetrate through to us. The effects of the absorbed radiation are interesting. The ionization in the upper atmosphere is increased and a million amperes or so are suddenly added to the three million amperes encircling the earth. The magnetic effects of the additional current are simultaneous over the earth and constitute the magnetic storm. The solar flare heats the high atmosphere in the daytime, causing it to expand outward. Calculation showed that the ionized layer should be lifted up about 50 miles during an average storm and measurements with radio signals showed that this was so, increases in height of 30 to 70 miles being observed during magnetic storms."

Science News Letter, October 18, 1930

Of the 26,000 oil wells dug last year, 8,000 returned no oil.

Buttermilk has about the same food value as skimmed milk, nutritionists find.

MEDICINE

U. S. Oldest Medical School Celebrates Anniversary

AMERICA has been producing her own doctors for 165 years. Ten years before the Revolution, two young doctors of this city, who had had to go to Scotland for their own medical training, founded the first medical school in our country. The young doctors were John Morgan and William Shippen, Jr. Each later served for a period as Medical Director-General of the American Army. The school they founded is the University of Pennsylvania Medical School.

Last week eminent physicians from this country and abroad came to Philadelphia to celebrate the school's 165 years of progress and to confer with her directors on plans for the future.

Besides Morgan and Shippen, the first faculty included Adam Kuhn of Germantown and Benjamin Rush, one of the signers of the Declaration of In-

dependence. These men and those who followed them helped to make medical history in the United States.

The school started in a wooden building known as Surgeon's Hall. It progressed from there to some rooms in the mansion built by the State of Pennsylvania for George Washington. Now it occupies its own modern buildings where every kind of equipment for teaching and practicing medicine is at hand.

The development of the medical clinic of today was discussed at the celebration by Prof. William H. Welch, "dean of American medicine." Prof. A. V. Hill, distinguished English biophysicist, and Sir Walter M. Fletcher, who has played an important role in the organization and development of medical research in Great Britain, also spoke.

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Chokeberry

THE bright berries of the chokeberry bush, ranging from red through purple to black, were ripe a month or more ago, but the fall of the leaves has made the shrubs more conspicuous. This ornamental wild plant with the unattractive name is one of the most widely distributed of our native species; it is found all the way from Maine to Minnesota and south to the Gulf of Mexico.

It is one of the plants that has proved a puzzle to the botanists. Some claim that the red and purple-black berries mark entirely distinct species, while others claim that they are all varieties of the same thing. Regarding their kinship, too, there is a deal of dispute, for they are assigned to the wild apple genus by one group of experts, while another school puts them in with the mountain-ash tribe. However, this is mainly a matter for doctors to disagree on, for wild apples and mountain ash themselves are pretty closely related.

The common name was probably suggested to the first incautious person who tried eating the attractive-looking fruits, for they are worse than a green quince for puckeriness. This violent astringency seems to be the property of the whole apple family; it is prominent in green apples and quinces, and survives in the mature fruits of a few of their kindred, of which the chokeberry is an outstanding representative.

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TEN CACTI

Blooming Size All different

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Table garden size \$2.00

JAMES ALLAN

Mountain Park New Mexico

RADIO-METEOROLOGY

Good Radio Reception Seen For Fall by Astronomer

GOOD radio reception of broadcasting stations, accompanied by few sunspots, is predicted for the coming fall months by Dr. Harlan T. Stetson, director of the Perkins Observatory at Ohio Wesleyan University, Delaware, Ohio. A detailed report of his findings appear in the *Journal of the Franklin Institute*, published in Philadelphia. By the time winter commences, however, there will be a general increase in the number of sunspots, which will be associated with somewhat poorer reception of broadcasting stations.

But even though the spots will be slightly more numerous than now, we will then be so far past the maximum in 1928 and 1929 of the eleven-year solar cycle that radio will not be affected nearly as much as in those years. After that the spots will become still less frequent, and by "1934 solar activity should be as quiescent as at the last minimum in 1923."

The Blame On Sunspots

Dr. Stetson warns against trying to blame too much on sunspots, however.

"The mention of sunspots invariably raises the question of a possible connection between spots on the sun and terrestrial phenomena," he says. "Some statisticians with an insatiable appetite for correlations have attempted to connect with sunspots almost every cycle in world affairs from fluctuations in the New York stock market to the fecundity of rabbits in northern Canada. In the popular mind almost every world catastrophe has sooner or later been attributed to sunspots, from a Florida hurricane to the great World War, both of which, by the way, did culminate around a sunspot maximum."

However, Dr. Stetson points out, there are some phenomena which have definitely been shown to be related to sunspots, such as magnetism, displays of the northern lights and radio reception. By means of a series of measurements since 1926 of the reception of station WBBM, in Chicago, as received in Massachusetts first, and now in Ohio as well, it was demonstrated that "long distance night reception in the broadcast zone is in general poor when

sunspots are numerous, and good when the spots are few."

Dr. Stetson found that in addition to the eleven-year cycle of sunspots there is a smaller period of about fifteen months, and that there is an exactly similar period of variation in the radio reception. In December, 1928, he predicted a marked increase in sunspots in September or October, 1929, a prediction which was entirely fulfilled.

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ARCHAEOLOGY

Ancient Art Forgery Dug Up in Italy

FAKING art works so as to make a cheap article appear rare and valuable is an old, old trade, and was practised by Phoenician traders to fool their Etruscan customers in Italy, over 2,500 years ago.

A vase, which is now recognized as one of these ancient art forgeries, was dug up recently in Italy, and for a time it has perplexed archaeologists at the Museum of the University of Pennsylvania. But the mystery is now solved.

The vase bears symbols which are apparently Egyptian hieroglyphics. But Egyptologists pronounced the markings meaningless. It appears that the Egyptians were famous as glass makers and workers in ceramics at the time this vase was made, about 700 B. C., and Egyptian ware was in demand among connoisseurs of Italy. Some Phoenician traders who sold such articles overseas, made cheaper vessels and covered them with designs and hieroglyphics to look Egyptian, and so cheated the Etruscans.

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March's Thesaurus Dictionary

Finds the word you have forgotten, and defines it. See full description in full page advertisement, issue of October 11, 1930.

Write for "Three Men and a Book," an entertaining little booklet showing the advantage of March.

Historical Publishing Co.
Dept. SCX, 1334 Cherry St., Phila., Pa.

• First Glances at New Books •

Psychology

TWINS: HEREDITY AND ENVIRONMENT—Nathaniel D. Mitron Hirsch—*Harvard University Press*, 159 p., \$2. In weighing the comparative importance of heredity and environment, scientists have looked to twins for aid, since twins provide two humans starting out in the race from practically the same start. Dr. Hirsch concludes that both heredity and environment contribute to intelligence and anthropomorphic qualities of the individual, but that the contribution of heredity is several times as important as that of environment. The book is considerably more than a report of an experiment, for there are other chapters on general facts about twins and monstrosities and on other experimental studies.

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Physics

MATTER AND RADIATION—John Buckingham—*Oxford University Press*, 139 p., \$3. As the author says in his preface, this book sets down "an outline of the theory of radiation, and, particularly, of the properties and uses of that group of invisible rays which are known as the Infra-Red." This purpose has been ably carried out, and a most interesting and informative book is the result. It is simply written and contains descriptions and illustrations of many experiments. However, its usefulness is greatly limited by the lack of an index and it is rather surprising that so distinguished a publishing firm should commit this unpardonable sin of book-making.

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Archaeology

A SUMERIAN PALACE AND THE "A" CEMETERY AT KISH, MESOPOTAMIA, Part II—Ernest Mackay—*Field Museum*, \$3.50. The first publication describing the architectural discoveries and rare Sumerian relics unearthed at Kish by the Field Museum-Oxford University Joint Expedition. Descriptions are given in detail and there are many illustrations.

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Mathematics

THE ARYABHATIYA OF ARYABHATA—Translated by Walter Eugene Clark—*University of Chicago Press*, 90 p., \$2.50. Aryabhata's work, which was composed in 499 A. D., is probably the oldest preserved text from the third or

scientific period of Indian astronomy, and is the earliest preserved Indian mathematical text. It is therefore of considerable importance in the history of astronomy and mathematics. This is the first attempt at a complete translation.

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Philosophy of Biology

THE SCEPTICAL BIOLOGIST—Joseph Needham—*Norton*, 270 p., \$3. In his chapter on "The Limitations of Optick Glasses" the author quotes Henry More to the effect that man has "no pair of spectacles made of the crystalline heaven, or of the *coelum empyreum*, to hang upon his nose for him to look through. And he adds his own comment, "He must never forget that he is wearing glasses of an inferior quality." Mental modesty of this kind justifies this British scholar in titling his book after Boyle, and safeguards him from the dogmatism that is the bane of too many scientists when they wander in the paths where their field borders on those of philosophy and religion. Readers will find the book like a dish of cool meats on a sultry day—nourishing without being heating.

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Physics

AN INTRODUCTION TO THE STUDY OF WAVE MECHANICS—Louis de Broglie, translated by H. T. Flint, *Dutton*, 249 p., \$4.25. When Prince de Broglie was awarded the Nobel Prize in physics last year, recognition was given to the author of one of the most important physical concepts in years, a concept that has necessitated considerable revision in our ideas of the atom and how it is put together. In this book, necessarily rather technical, the prince develops the subject from the ideas upon which it is based. The principle of indeterminateness as well as recent experiments on diffraction of electrons is also discussed. It is likely that this book will rank as a classic in physical science.

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Aviation

PLAYING AIRPLANE—J. F. McNamara—*Macmillan*, 128 p., \$2.50. Youngsters not yet ten will be thrilled when this book is read to them. The author is an ex-aviator who wrote it to answer the questions of his own six and eight-year-old sons and their friends.

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Astronomy

ASTRONOMY—Robert H. Baker—*Van Nostrand*, 521 p., \$3.75. In this recent text book of astronomy the professor of astronomy at Illinois has produced an excellent introduction to the latest knowledge of this important subject. It is one of the first astronomical texts to include an account of Pluto, the trans-Neptunian planet, though there has not been time to include the name or the latest orbit computations, made possible by the discovery of photographs of the object made as far back as 1919. Other recent work, such as the newest knowledge of the extragalactic nebulae and work on stellar atmospheres, is fully covered, but not with any sacrifice of the fundamentals. In short, it is a book that can be recommended to both the teacher of astronomy and the lay reader who wishes a complete account of the subject.

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General Science

PROBLEMS IN GENERAL SCIENCE—George W. Hunter and Walter G. Whitman, *American Book Co.*, 688 p., \$1.72. A new general science text by two teachers of wide experience. By the use of such modern developments as television, transatlantic flights, talking movies, etc., an effort is made to arouse the student's interest, and the numerous and well-selected illustrations help materially. It is a book that should make the student think for himself.

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Public Health

INDUSTRIAL HYGIENE FOR SCHOOLS—Jesse F. Williams, M. D., and Delbert Oberteuffer, Ph. D.—*McGraw-Hill*, 280 p., \$2. This text-book might well be read by employers and industrial managers. Essential information on medicine, sanitation and accident-prevention is given in compact form.

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Psychology

STATISTICAL RESUME OF THE SPEARMAN TWO-FACTOR THEORY—Karl J. Holzinger—*University of Chicago Press*, 43 p., 75c. This publication supplements Spearman's own analysis of his theory that mental abilities may be resolved into two factors, as given in "The Abilities of Man." The resume is more detailed and brings in some of the related work of Garnett and Kelley.

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• First Glances at New Books •

(Continued from page 255)

Physics

THE PHYSICAL PRINCIPLES OF THE QUANTUM THEORY—Werner Heisenberg, translated by Carl Eckart and Frank C. Hoyt—*University of Chicago Press*, 186 p., \$2. In 1929 Dr. Heisenberg, who is one of the leaders in the recent revolution in physics, gave a series of lectures on the quantum theory at the University of Chicago. These have now been translated into English and published so as to be available to a larger group than could hear them originally. In the words of Dr. Arthur H. Compton, Dr. Heisenberg here "discusses primarily the physical significance of the new theory, emphasizing the equal applicability of the corpuscular and wave concepts and the need for his uncertainty principle to reconcile the two points of view."

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General Science

GENERAL SCIENCE—Richard W. Sharpe—*Oxford Book Co.*, 230 p., 72c. Another volume in the Oxford Review Series, useful for teacher and student alike who wants a complete but concise summary of the subject. A number of questions, some taken from examinations set by the University of the State of New York, will give the teacher some good ideas.

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Physics

SPECTRA—R. C. Johnson—*Dutton*, 104 p., \$1.15. In this new volume in the series of Monographs on Physical Subjects the student of physics will find a concise summary of the contributions spectroscopy has made to modern physics. The chapter headings give an idea of the scope of the book, viz., the quantum theory, line spectra, band spectra and spectroscopy.

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Archaeology

THE TECHNICAL ARTS AND SCIENCES OF THE ANCIENTS—Alfred Neuburger—*Macmillan*, 518 p., \$10. The author has collected from a vast and scattered literature a solid compendium of information about the technology of the ancients, much of which was of a very high order at early dates. Metallurgy, wood and leather work, agriculture and the elaboration of agricultural products, glass, textiles and pottery all receive extensive treatment. There are chapters also on towns, fortifications, water systems, sewers, irrigation and drainage, roads and bridges, ships and shipbuilding.

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Education-Sociology

THOSE IN THE DARK SILENCE—Corinne Rocheleau and Rebecca Mack—*Volta Bureau, Washington, D. C.*, 169 p., \$2. The plight of the rank and file of deaf-blind people—the most neglected class in our world today—is set forth in this book, for the information of the public and for the guidance of teachers and others who have the personal problem of dealing with these doubly handicapped individuals. The first part of the book contains a general, but practical, discussion of home and school education, vocational training, social interests and other problems, and recommends as one specific aid a central institution to be a clearing house of advice and information. The second part contains biographies of deaf-blind individuals.

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Public Health

HISTORY OF HAITIAN MEDICINE—Robert P. Parsons—*Hoeber*, 196 p., \$2.25. The book is interesting from many viewpoints, but to the public health worker it will be particularly inspiring, because it is largely a dramatic story of how 15 years of public health measures and preventive medicine have successfully supplanted centuries of superstition and indifference. The student of social and political science will be interested in Dr. Parsons' view of the results of retirement of the American Occupation in Haiti, as relating to health conditions in the island.

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Chemistry

ENZYME CATALYSTS—E. F. Armstrong and T. P. Hilditch—*National Research Council*, 25c. The report of the committee on contact catalysts, reprinted from the *Journal of Physical Chemistry*.

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Mechanics

APPLIED MECHANICS—Frederic N. Weaver—*Ronald*, 322 p., \$3.25. A text book for engineering colleges that starts with statistics and friction and continues without a break through the subject of motion, the sections on center of gravity and moment of inertia being placed in an appendix. It is the author's belief that these should be covered in a course in mathematics rather than in mechanics. He assumes an elementary knowledge of the calculus but not of physics.

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Dietetics

EAT AND KEEP FIT—Lyman F. Kehler, with an introduction by Harvey W. Wiley—*Author*, 302 p., \$3. To quote Dr. Wiley: "The author has followed strictly scientific principles in showing how a reasonable degree of food can be consumed without any unnecessary increase in weight . . . how to decrease without threat to health, any superabundance of adipose tissue." In addition, the book is entertainingly written and full of all sorts of useful facts.

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Archaeology

THE EXCAVATION AND REPAIR OF BETATAKIN—Neil Merton Judd—*Smithsonian Institution*, 77 p., 46 plates, free. This Pueblo ruin, now a part of the Navajo National Monument, was discovered in 1909. Mr. Judd was with that discovery party. Eight years later he was given the task of preserving and repairing the ruin, and good progress was being made when the World War interrupted the work. Unfortunately, the chance to complete the preservation of these much-visited ruins has not come, and Mr. Judd decided to delay no longer in presenting a record of his unfinished project.

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Physics

THE THEORY OF THE POTENTIAL—William Duncan MacMillan—*McGraw-Hill*, 469 p., \$5. In this new work the professor of astronomy at the University of Chicago has produced a summary of this interesting field of mechanics. Though necessarily involving the use of the calculus, the author does not assume knowledge of integral equations. The book should be useful both to students of mathematics and of mathematical physics.

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Education

DOCTORATES CONFERRED IN THE SCIENCES BY AMERICAN UNIVERSITIES, 1928-1929—Callie Hull and Clarence J. West—*National Research Council*, 50c. Of special interest to research investigators and to educators will be this report compiled for the research information service of the National Research Council.

Science News Letter, October 18, 1930

Physiology

HERZ, PULSATION UND BLUTBEWEGUNG—Georg Hauffe—*Lehmann, Munich*, 246 p., RM 16. A solid summary of the latest information regarding the circulatory system.

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